EMFAC Modeling Change Technical Memo

SUBJECT: ON-ROAD EMISSIONS INVENTORY FUEL CORRECTION FACTORS

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SUMMARY

Fuel correction factors (FCF) are used in the on-road emission inventory model, EMFAC, to reflect the impact on emissions of commercially dispensed fuel compared to fuel used during the certification process. Within the EMFAC model, the FCFs are calendar-year, model-year, and geographic-area specific multipliers applied to the basic emission rates. These factors are derived as the ratio of the impact of the dispensed fuel to the impact of the certification fuel.

Fuel Reid Vapor Pressure (RVP) primarily impacts evaporative emissions while the sulfur content of fuel impacts the estimated emissions of oxides of sulfur (SOx). Other properties of the fuel including aromatic hydrocarbon content, olefin content, and T50 and T90 distillation temperatures impact the exhaust emissions of other criteria pollutants including exhaust hydrocarbons (HC), carbon monoxide (CO), oxides of nitrogen (NOx), and particulate matter (PM).

Staff is suggesting the following modifications to the FCFs be included in the latest update of the on-road emissions inventory for both gasoline and diesel FCFs.

- Modify the fuel correction factors for Phase II reformulated gasoline (RFG) for the 1996 through 2003 calendar years to be cumulative to the Phase I (1992-1995 calendar year) values.
- Eliminate the emission benefit previously given for vehicles introduced after the availability of reformulated gasoline because these vehicles could certify on the reformulated gasoline.*
- Change the diesel fuel correction factors to 0.93 for NOx and 0.75 for PM as a result of the aromatics and sulfur change in 1994. This benefit is assumed regardless of fuel-injection type.
- Incorporate the new sulfur level for fuels. The sulfur change for 2007 was modeled as a 0.72 PM correction factor. This cumulative factor was not applied to new engines after 2007, which are assumed to certify on ultra low-sulfur diesel.
- Add a new fuel correction factor for exhaust hydrocarbon benefits for clean diesel fuel.
- Incorporate an out-of-state diesel fleet fueling rate of 10%, which changes the overall NOx fuel correction factor from 0.93 to 0.937.
- Apply exhaust fuel correction factors to idle emission rates for diesel fuel.
- Adjust 1996+ model-year BERs to an RFGII basis.

*Given the variety of certification options available to manufacturers, staff continues to investigate the appropriateness of the assumption that new vehicles should receive no benefit from fuel reformulation.

A summary of the statewide results is shown in Tables 1 and 2 below. Taken together, these changes are estimated to increase the on-road motor vehicle emissions inventory for calendar year 2015 by 23 tons per day (tpd) or 1% for CO, 17 tpd or 3% for NOx, and decrease the statewide inventory by 6 tpd or 2% for HC, and by 1.2 tpd or 4% for PM.

Table 1
Summary of Emissions Changes due to Revised Fuel Correction Factors
Calendar Year 2002

Air Basin	Emission Changes by Pollutant, tons per day				
	HC	CO	NOx	CO_2	PM
Statewide	-12.4	-27.2	35.3	0.0	-1.2
South Coast	-1.1	-2.2	3.1	0.0	-0.1
San Joaquin Valley	-1.0	-2.2	2.4	0.0	-0.1
Sacramento Valley	-3.1	-19.3	3.2	0.0	-0.2
San Diego	-1.3	10.8	8.8	0.0	-0.2
San Francisco Bay Area	-4.3	-10.4	13.3	0.0	-0.4

Table 2
Summary of Emissions Changes due to Revised Fuel Correction Factors
Calendar Year 2015

Air Basin	Emission Changes by Pollutant, tons per day				
	HC	CO	NOx	CO_2	PM
Statewide	-5.6	22.5	17.0	0.0	-1.2
South Coast	-0.4	1.5	1.3	0.0	-0.1
San Joaquin Valley	-0.5	2.1	1.3	0.0	-0.1
Sacramento Valley	-1.0	5.9	3.4	0.0	-0.2
San Diego	-1.0	2.2	2.8	0.0	-0.2
San Francisco Bay Area	-1.8	9.4	6.0	0.0	-0.4

Detailed emissions inventory breakdowns showing the impacts by fuel and area are shown in Tables 23 through 28. The areas covered are statewide, Sacramento Valley, San Diego, San Francisco Bay Area, San Joaquin Valley, and the South Coast Air Basin. The years covered are 2002, 2005, 2010, 2015, and 2020.

NEED FOR REVISION

Sulfur / Lead

Table 3 presents the EMFAC2002 assumptions for sulfur and lead content of various fuels. The model was last updated in August of 2001 to reflect the measured properties of in-use fuels rather than the nominal standards reflected in previous versions of the models. Table 3 is divided into two geographic regions reflecting the early introduction of low sulfur diesel fuel into the South Coast Air Basin (SCAB) and Ventura County. The assumed sulfur content of the fuel impacts the oxides of sulfur (SOx) and particulate matter (PM) estimates in EMFAC. Lead is also directly reported by the model.

Table 3
EMFAC2002 Sulfur and Lead Content of Fuels

	Fuel Sulfur Content (ppmw)						Lead (g/gal)
	SCAB & Ventura			All Other Areas			Statewide
Cal Year	Leaded	Unleaded	Diesel	Leaded	Unleaded	Diesel	Leaded
Pre-72	610	380	2650	610	380	2650	2.080
1972	610	380	2650	610	380	2650	1.959
1973	610	380	2650	610	380	2650	1.904
1974	610	380	2650	610	380	2650	1.956
1975	610	380	2650	610	380	2650	1.843
1976-77	620	290	2340	620	290	2340	1.843
1978	350	190	3080	350	190	3080	1.843
1979	380	200	2850	380	200	2850	1.120
1980	330	210	2720	330	210	2720	0.831
1981	290	190	2800	290	190	2800	0.697
1982	310	210	2910	310	210	2910	0.783
1983	420	180	3150	420	180	3150	0.738
1984	360	250	3280	360	250	3280	0.660
1985	340	210	1050	340	210	3000	0.332
1986	400	220	950	400	220	3000	0.324
1987	400	220	850	400	220	3000	0.260
1988	400	220	500	400	220	3000	0.083
1989-90	400	220	500	400	220	3000	0.080
1991	151	151	500	151	151	3000	0.080
1992	151	151	500	151	151	3000	0
1993	151	151	500	151	151	500	0
1994	151	151	150	151	151	150	0
1995	151	151	130	151	151	140	0
1996-02	20	20	130	20	22	140	0
2003-06	15	15	130	15	15	140	0
2007+	15	15	15	15	15	15	0

These measured properties were obtained through the Air Resources Board's motor vehicle fuels inspection program. In this program, inspectors obtain samples of commercially available gasoline and diesel fuel for laboratory analysis. Tests are performed to determine the aromatic content, sulfur level, RVP and other constituents of the dispensed fuels. No changes to these assumptions are anticipated in this update.

Reformulated Gasoline

The current modeled benefits for reformulated gasoline are provided in Table 4. The following sections describe the general basis for the benefits and the proposed modifications. They are expressed as multiplicative correction factors that are applied to the basic exhaust emission rates.

All of the proposed modifications for on-road gasoline-powered engines are presented in Table 6, following the technical discussions.

Table 4
Current Fuel Correction Factors (FCF) for Cleaner-Burning Gasoline

		Summertime			Wintertime		
Cal Year	**Model Year**	**HC***	**CO**	**NOx**	**HC***	**CO**	**NOx**
Pre-92	All	1.000	1.000	1.0000	1.000	1.000	1.0000
1992-95	All	0.988	0.994	0.9970	0.963	0.895	0.9970
1996-03	All	0.860	0.890	0.8900	0.860	0.890	0.8900
2004+	All	0.860	0.890	0.8695	0.860	0.890	0.8695

* Exhaust only

RFG I (1992-1995 Calendar Years)

The assumed exhaust emission benefits of RFGI were based on the results of the auto/oil studies performed in the early 1990s and have remained unchanged since the introduction of EMFAC7F. General documentation for the changes are presented in the staff report for Phase I Reformulated Gasoline released in November 1990.

Evaporative hydrocarbon emissions are a strong function of fuel volatility and it is the regional and seasonal variation in dispensed fuel RVP that generally dictates the magnitude of the evaporative emissions inventory. In EMFAC, the change in fuel from pre-CBG (pre cleaner burning gasoline) to RFG I to RFG II is modeled by RVP correction algorithms.

For RFGI, staff is proposing to change the fuel correction factors applicable to 1992 through 1995 vehicles to 1.0 to reflect the fact that these model year vehicles could certify on RFGI. Therefore, no benefit should be provided.

RFGII (1996-2003 Calendar Years)

An 11-percent reduction in carbon monoxide (CO) and oxides of nitrogen (NOx), and a 14-percent reduction in exhaust emissions of reactive organic gases (ROG) associated with RFGII is assumed for all vehicles, applicable to all processes (starts, running and idle) and all seasons. These percentages were based on an analysis of numerous motor vehicle emissions studies designed to evaluate fuel effects. General documentation is provided in the staff report on Phase II RFG released in October 1991. This estimate was incorporated into EMFAC2000.

There are two proposed changes to the fuel correction factors related to the introduction of RFGII. The first change applies to pre-1992 model year vehicles during the 1996 through 2003 calendar years. Although the benefits of RFGI and RFGII are meant to reflect a cumulative impact, EMFAC currently treats the impacts independently. This results in an underestimation of the cumulative benefits of both RFGI and RFGII of 1% for ROG and CO for pre-1992 vehicles for calendar years 1996 through 2003. These benefits will be adjusted accordingly in the next revision of the model.

Similar to RFGI, staff is proposing to change the fuel correction factors applicable to 1996 through 2003 vehicles to 1.0 in order to reflect the fact that these model year vehicles could certify on RFGII and should therefore receive no additional benefit.

In the current version of the model, the basic emission rates (BERs) are actually based on pre-RFGII fuel and staff believes that the BERs must be adjusted accordingly. Table 5 displays the proposed corrections to the BERs for the on-road gasoline-powered engines for model year groups 1996-03 and 2004 and later.

Table 5
BER Adjustment for Cleaner-Burning Gasoline

		Summertime			Wintertime		
Cal Year	**Model Year**	**HC**	**CO**	**NOx**	**HC**	**CO**	**NOx**
1996-03	All	0.860	0.890	0.8900	0.860	0.890	0.8900
2004+	All	0.860	0.890	0.8900	0.860	0.890	0.8900

The proposed adjustment ascribes the previously assumed fuel benefit of 14% for HC and 11% for CO and NOx, to the basic emission rates effectively putting the 1996+ BERs on a RFGII basis.

RFGIII (2004+ Calendar Years)

The benefits of RFGIII are modeled to be the same as those of RFGII with the exception of NOx which is estimated to be 2.3% above and beyond the benefit of RFGII assumed in EMFAC2002 (FCF=0.8695). This is due to the lower sulfur content of RFGIII fuel. When this estimate was originally made in July of 2001, it was interpreted to include the impact of oxygenates (*i.e.* no federal waiver). In EMFAC, the impacts of ethanol and MTBE were assumed to be the same for exhaust. However, no adjustment was made for any presumed increase in evaporative emissions associated with the use of ethanol. In September of 2002, staff revised EMFAC2002 to reflect a delay in the implementation of RFGIII for one year from 2003 to 2004 per Executive Order D-52-02.

There are two proposed changes to the fuel correction factors related to the introduction of RFGIII. Similar to the changes for RFGII, the first proposed change applies to pre-1992 model year vehicles during the 2004+ calendar years and carries the cumulative benefits of RFGI, RFGII, and RFGIII. The second change applies to the 1992 through 1995 model year vehicles during the 2004 and later calendar years and reflects the cumulative benefits of RFGII and RFGIII. Since the post-2004 cars are not allowed to certify on the lower sulfur content RFGIII fuel, the same benefit was assigned the 2004+ vehicles as the 1996-2003 vehicles.

Ethanol

As stated earlier, gasoline containing ethanol has been commercially available in California for some time. Staff has estimated the impact of ethanol on evaporative processes and intends to incorporate this new methodology in the EMFAC update. In general, the magnitude of the emissions increase is a strong function of ambient temperature used as a surrogate for the temperature of the fuel. Therefore, the estimation is region- and season-specific. This methodology is outlined in a separate memo entitled “Increased Evaporative Emissions Due To Ethanol Permeation.”

Table 6
Proposed Revisions to the Fuel Correction Factors For Cleaner Burning Gasoline

		Summertime			Wintertime		
Cal Year	**Model Year**	**HC**	**CO**	**NOx**	**HC**	**CO**	**NOx**
		Pre-Cleaner Burning Gasoline					
Pre-92	All	1.000	1.000	1.0000	1.000	1.000	1.0000
		RFG I					
1992-95	Pre-1992	0.988	0.994	0.9970	0.963	0.895	0.9970
1992-95	1992-1995	1.000	1.000	1.0000	0.963	0.895	0.9970
		RFG II					
1996-03	Pre-1992	0.850	0.884	0.8873	0.850	0.884	0.8873
1996-03	1992-1995	0.860	0.890	0.8900	0.860	0.890	0.8900
1996-03	1996+	1.000	1.000	1.0000	1.000	1.000	1.0000
		RFG III					
2004+	Pre-1992	0.850	0.884	0.8669	0.850	0.884	0.8669
2004+	1992-1995	0.860	0.890	0.8695	0.860	0.890	0.8695
2004+	1996-03	1.000	1.000	0.9770	1.000	1.000	0.9770
2004+	2004+	1.000	1.000	0.9770	1.000	1.000	0.9770

Diesel Fuel

Currently, diesel fuel benefits are modeled in three separate steps. The first step was to reflect the impact of lowering the sulfur content of diesel fuel to 500 ppm for the South Coast and Ventura County. The second step involved reducing the aromatic hydrocarbon content to 10% by volume and sulfur content to 500 parts per million by weight (ppmw) starting in 1994, on a statewide basis. The third, reflecting a reduction in sulfur to 15 ppmw, will be fully implemented beginning in 2007. The current modeled benefits for diesel fuel are provided in Table 7. (Note that the sulfur contents are provided in Table 3.)

The following sections describe the general basis for the benefits and the proposed modifications. They are expressed as multiplicative correction factors that are applied to the basic exhaust emission rates. All of the proposed modifications for the on-road diesel-powered engines are presented in Table 8, following the technical discussions.

Table 8
Current Clean Diesel Fuel Correction Factors

		SCAB & Ventura		Not SCAB & Ventura	
Cal Year	**Model Year**	**NOx**	**PM**	**NOx**	**PM**
Pre-1985	All	1.000	1.000	1.000	1.0000
1985-1993	Pre-1991	1.000	0.9610	1.000	1.0000
1994-2006	Pre-1991	0.944	0.7940	0.944	0.7940
2007+	Pre-1991	0.944	0.7622	0.944	0.7622
1985-1993	1991-1993	1.000	0.7730	1.000	1.0000
1994-2006	1991-1993	0.876	0.6720	0.876	0.6720
2007+	1991-1993	0.876	0.6451	0.876	0.6451
1994-2006	1994-2006	0.876	0.8990	0.876	0.8990
2007+	1994-2006	0.876	0.8630	0.876	0.8630
2007+	2007+	0.876	0.8990	0.876	0.8990

500 ppmw sulfur (1985–1993 Calendar Years)
10% aromatics/500 ppmw sulfur (1993–2006 Calendar Years)

The current benefits of the second phase of diesel reformulation assumed in the model were derived from an analysis of the CRC VE1 project. In this study, two engines, one representing mechanical fuel-injection and the other electronically injected engines, were tested. Because these engines were found to respond differently to changes in fuel properties, the impact of clean diesel was modeled in three stages (calendar years) for two geographic regions and two broad technology groups:

- Pre-1985–Prior to diesel reformulation the FCF=1 for all vehicles.
- 1985–Low sulfur diesel was introduced in the South Coast and Ventura.
- 1994–Low sulfur and low aromatic fuels were required statewide.
  - A separate FCF is computed for mechanically injected (pre-1991) engines
  - A separate FCF is computed for electronically injected (post-1990) engines.

For this analysis, only benefits for NOx and PM were determined.

Based on a peer-reviewed analysis of more extensive vehicle testing, the staff is proposing that a single correction factor be used to reflect the benefits for the entire fleet (7% reduction for NOx and a 25% reduction for PM). The results of this subsequent test program reinforce the magnitude of their proposed benefit. The staff's analysis is generally documented in the report entitled "Staff Review of the Emission Benefits of California's Diesel Fuel Program" and is attached as Appendix D of the staff report entitled "Proposed Amendments to the California Diesel Fuel Regulations--Initial Statement of Reasons" dated June 6, 2003.

It has also been suggested that the 10% aromatic-hydrocarbon requirement for clean diesel has resulted in an increase in the cetane number of dispensed fuel. Analysis of the impact of higher cetane was conducted by the CRC in the VE-1 project and by the U.S. EPA in their HDEWG test program. The results of these test programs show an average exhaust hydrocarbon benefit of 28%. Therefore, the staff is proposing that a fuel correction factor of 0.72 be applied to all on-road diesel-powered vehicles beginning with the 1994 calendar year.

10% aromatic/15 ppmw sulfur (2007+ Calendar Years)

By 2007, 15 ppmw sulfur diesel fuel will be available statewide. The PM benefit for this secondary reduction in sulfur is assumed to be an additional 4%. This factor was taken from Appendix IV of the Fuels Report: Appendix to the Diesel Risk Reduction Plan, October 2000. Because federal diesel will be equivalent to that available in California with the exception of aromatic content, 2007 and newer vehicles are not assumed to benefit from the secondary sulfur reduction.

The majority of the 25% PM reduction discussed earlier is attributable to the aromatic content of the fuel rather than the reduction in sulfur. As a result, a 20% PM reduction is assumed for calendar years 2007+ and for model years 2007+ reflecting the lower aromatic content of California diesel fuel compared to federal certification fuel. As mentioned in the previous paragraph, lowering the sulfur content to 15 ppmw results in an additional 4% reduction in PM. This is reflected in the Pre-2007 model-year group for calendar years 2007+ (0.75*0.96 = 0.72).

Table 9
Proposed Revisions to the Fuel Correction Factors for Clean Diesel

		SCAB and Ventura			All Other Areas		
Cal Year	**Model Year**	**NOx**	**PM**	**HC**	**NOx**	**PM**	**HC**
Pre-1985	All	1.00	1.00	1.00	1.00	1.00	1.00
1985-1993	All	1.00	0.95	1.00	1.00	1.00	1.00
1994-2006	All	0.93	0.75	0.72	0.93	0.75	0.72
2007+	Pre-2007	0.93	0.72	0.72	0.93	0.72	0.72
2007+	2007+	0.93	0.80	0.72	0.93	0.80	0.72

Out-Of-State Diesel

Based on information gathered by the U.S. Department of Census through their Truck Inventory and Use Survey (TIUS), it is currently assumed that 25% of all heavy-heavy duty diesel trucks in use in California at any given time originate outside of the state. It is also assumed that these vehicles utilize clean diesel while in California and therefore benefit from its use.

An analysis of International Fuel Tax Agreement (IFTA) data suggests that between 24% and 26% of interstate trucks operating in California, dependent upon the price of diesel fuel, utilize non-California diesel while in the state. This led to estimates of up to 25% of the diesel fuel consumed in the State being federal diesel on the upper bound (all the out-of-state trucks using only out-of-state fuel in California) and as low as 6% federal diesel usage (25% of the 25% out-of-state trucks).

For the year 2000, Board of Equalization records for diesel sales in California were about 8% lower than EMFAC estimates of diesel fuel used, suggesting that 8% of the fuel consumed in the State came from outside the State.

Given the uncertainty in this estimate, staff proposes to reflect the impact of non-California diesel fuel use in the update of the model by assuming that 10% of all diesel fuel used by heavy-heavy duty diesel trucks is federal diesel.

Correction to Idle Emission Rates

In previous versions of EMFAC, the benefits of fuel reformulation for diesel fuel were taken only for the exhaust emissions process. Staff is suggesting that those benefits assumed for exhaust also be applied to idle emissions.

The proposed fuel correction factors reflecting this change are displayed in the Methodology for Revision section below.

AFFECTED SOURCE CODE/VERSION

FCF_DATA.for (8/17/2001).
BER_DATA.for (8/09/2002).

METHODOLOGY FOR REVISION

Gasoline

The tech groups corresponding to the various model year groupings are shown in Table 9. The old and new fuel correction factors are listed below in Table 10.

Table 9
Gasoline Model year Tech Group Bins

91- MY	Tech Groups 1-16, 40-43, 46-49, 76-79, 106-109, 136-140, 228-231, 260-265
92-95 MY	Tech Groups 17, 18, 21, 50, 80, 110, 141, 232
96-03 MY	Tech Groups 19-20, 22-24, 26-27, 51-52, 81-82, 111, 142, 233, 266-269
04+ MY	Tech Groups 28-37, 53-57, 83-87, 112-114, 143-144, 234-237, 270-277

Table 10
Gasoline Fuel Correction Factors

	Revised Fuel Correction Factors				Existing Fuel Correction Factors			
	Calendar Year				Calendar Year			
	91-	92	96	04	91-	92	96	04
Model year								
91- Summer HC	1.000	0.988	0.850	0.850	1.000	0.988	0.860	0.860
91- Summer CO	1.000	0.994	0.884	0.884	1.000	0.994	0.890	0.890
91- Summer NOx	1.000	0.997	0.8873	0.8669	1.000	0.997	0.890	0.8695
91- Winter HC	1.000	0.963	0.850	0.850	1.000	0.963	0.860	0.860
91- Winter CO	1.000	0.895	0.884	0.884	1.000	0.895	0.890	0.890
91- Winter NOx	1.000	0.997	0.8873	0.8669	1.000	0.997	0.890	0.8695
92-95 Summer HC		1.000	0.860	0.860		0.988	0.860	0.860
92-95 Summer CO		1.000	0.890	0.890		0.994	0.890	0.890
92-95 Summer NOx		1.000	0.890	0.8695		0.997	0.890	0.8695
92-95 Winter HC		0.963	0.860	0.860		0.963	0.860	0.860
92-95 Winter CO		0.895	0.890	0.890		0.895	0.890	0.890
92-95 Winter NOx		0.997	0.890	0.8695		0.997	0.890	0.8695
96-04 Summer HC			1.000	1.000			0.860	0.860
96-04 Summer CO			1.000	1.000			0.890	0.890
96-04 Summer NOx			1.000	0.977			0.890	0.8695
96-04 Winter HC			1.000	1.000			0.860	0.860
96-04 Winter CO			1.000	1.000			0.890	0.890
96-04 Winter NOx			1.000	0.977			0.890	0.8695
04+ Summer HC				1.000				0.860
04+ Summer CO				1.000				0.890
04+ Summer NOx				0.977				0.8695
04+ Winter HC				1.000				0.860
04+ Winter CO				1.000				0.890
04+ Winter NOx				0.977				0.8695

Diesel

The diesel model-year groupings are shown in Table 11 below. This revision substantially lowers the effect of model year.

Table 11
Diesel Tech Group Model Year Bins

93- MY	Tech Groups 60-66, 90-96, 120-126, 170-176, 178-183, 186-192, 216-218, 240-246
93- HHD	Tech Groups 150-156, 200-205
94-06 MYs	Tech Groups 67-70, 97-100, 127-130, 177, 184, 185, 193, 194, 219-223, 247-250
94-06 HHD	Tech Groups 157-160, 206-209
07+ MY	Tech Groups 71, 101, 131, 224, 225, 251
07+ HHD	Tech Groups 161, 210, 211

The revised diesel fuel correction factors are shown in Table 12. These are the result of statistical analysis of several studies.

Table 12
Diesel Fuel Correction Factors

	Revised Fuel Corr Facts				Existing Fuel Corr Facts			
	Calendar Year				Calendar Year			
	84-	85	94	07+	84-	85	94	07+
Model Year		-93	-06			-93	-06	
90- Cal NOx	1.00	1.00	0.93	0.93	1.00	1.00	0.944	0.944
90- Cal PM	1.00	1.00	0.75	0.72	1.00	1.00	0.794	0.7622
90- SCAB NOx	1.00	1.00	0.93	0.93	1.00	1.00	0.944	0.944
90- SCAB PM	1.00	0.95	0.75	0.72	1.00	0.961	0.794	0.7622
91-93 Cal NOx		1.00	0.93	0.93		1.00	0.876	0.876
91-93 Cal PM		1.00	0.75	0.72		1.00	0.672	0.6541
91-93 SCAB NOx		1.00	0.93	0.93		1.00	0.876	0.876
91-93 SCAB PM		0.95	0.75	0.72		0.773	0.672	0.6541
94-06 Cal NOx			0.93	0.93			0.876	0.876
94-06 Cal PM			0.75	0.72			0.899	0.863
94-06 SCAB NOx			0.93	0.93			0.876	0.876
94-06 SCAB PM			0.75	0.72			0.899	0.863
07+ Cal NOx				0.93				0.876
07+ Cal PM				0.80				0.899
07+ SCAB NOx				0.93				0.876
07+ SCAB PM				0.80				0.899

Out-of-State Fueling

A survey of truckers performed by Caltrans indicated that about 10% of the diesel fuel usage in the State was federal out-of-state fuel. To model this, the fuel correction factors for engines on EPA fuel were weighted with the fuel correction factors for engines on California fuel. Table 13 shows the derivation of the combinations.

Table 13
Correction for Out-Of-State Fueling

	EPA (10%)		CA (90%)		Weighted
	Correction Factor	Note	Corr Fact	Note	Corr Fact
NOx	1.0		0.93	Aromatics	0.937
PM (SCAB 500)	1.0		0.95	(0.05 S)	0.955
PM (500 ppm S)	0.95	(0.05 S)	0.75	(0.05 S + 0.20 Arom)	0.770
PM (15 ppm S)	0.92	(0.05 + 0.03 S)	0.72	(0.05+0.03 S + 0.20 Arom)	0.740
PM 07+	1.0		0.80	(0.20 Arom)	0.820
HC 94+	1.0		0.72	Cetane	0.748

For example, in Table 13 for NOx, if 10% of the trucks use federal fuel (1.0 correction factor) and 90% of the trucks use California Clean Diesel (0.93 correction factor for NOx emissions), then the fleet average is $0.1 \times 1.0 + 0.9 \times 0.93 = 0.937$. In Table 13, the PM corrections are given by stage. The notes refer to the percentage-point reduction for the particular level or strategy. For example, the PM (500 ppm S) line, for the case where federal fuel went to 500 ppm S EPA diesel in 1994 and the State had gone to California Clean Diesel, the correction factor applied to the Clean Diesel included the effects of aromatics reduction and sulfur reduction, whereas for the EPA diesel only the effect of lower sulfur is included. The resulting fleet-average fuel correction factor accounting for 10% usage of federal diesel is $0.1 \times 0.95 + 0.9 \times 0.75 = 0.770$.

This correction is only applied to heavy heavy-duty diesel trucks. At this time, we only have fuel information for the State as a whole. We realize that some areas will have a higher percentage of out-of-state fueling (border areas with long interstate truck routes). However, we do not have sufficient data to quantify the regional differences. Therefore, this revision of the model (like its predecessors) assumes that the percentage of out-of-state diesel usage is the same throughout the State.

Table 14 below shows the resulting corrected diesel fuel correction factors.

Table 14
Diesel Fuel Correction Factors Corrected for Out-of-State Fueling

	Revised Fuel Correction Factors				Existing Fuel Correction Factors			
	Calendar Year				Calendar Year			
	84-	85	94	07+	84-	85	94	07+
Model Year		-93	-06			-93	-06	
90- Cal NOx	1.00	1.00	0.93	0.93	1.00	1.00	0.944	0.944
90- Cal PM	1.00	1.00	0.75	0.72	1.00	1.00	0.794	0.7622
90- SCAB NOx	1.00	1.00	0.93	0.93	1.00	1.00	0.944	0.944
90- SCAB PM	1.00	0.96	0.75	0.72	1.00	0.961	0.794	0.7622
91-93 Cal NOx		1.00	0.93	0.93		1.00	0.876	0.876
91-93 Cal PM		1.00	0.75	0.72		1.00	0.672	0.6541
91-93 SCAB NOx		1.00	0.93	0.93		1.00	0.876	0.876
91-93 SCAB PM		0.96	0.75	0.72		0.773	0.672	0.6541
94-06 Cal NOx			0.93	0.93			0.876	0.876
94-06 Cal PM			0.75	0.72			0.899	0.863
94-06 SCAB NOx			0.93	0.93			0.876	0.876
94-06 SCAB PM			0.75	0.72			0.899	0.863
06- Cal HHD NOx	1.00	1.00	0.94	0.94				
06- Cal HHD PM	1.00	1.00	0.77	0.74				
06- SCAB HHD PM	1.00	0.96	0.77	0.74				
07+ Cal NOx				0.93				0.876
07+ Cal PM				0.80				0.899
07+ SCAB NOx				0.93				0.876
07+ SCAB PM				0.80				0.899
07+ Cal HHD NOx				0.94				
07+ Cal HHD PM				0.82				

Diesel Hydrocarbon Reductions

Analysis of the Diesel Fuel Properties-Emissions studies (for NOx and PM) also indicated an exhaust hydrocarbon benefit for low-aromatic or high-cetane diesel fuel. Previously there were only PM and NOx correction factors for diesel. This change entailed adding a new pollutant category to each of the tech groups (see Table 15).

Table 15
Diesel Fuel Hydrocarbon Fuel Correction Factors

	Fuel Correction Factors			
	Calendar Year			
	84-	85	94	07+
Model Year		-93	-06	
93- HC	1.00	1.00	0.72	0.72
93- HHD HC	1.00	1.00	0.748	0.748
94+ HC			0.72	0.72
94+ HHD HC			0.748	0.748

Diesel Idle Emission Rate Reductions

Table 16
Diesel Fuel Correction Factors for Idle Mode

	Fuel Correction Factors Calendar Year			
	84-	85	94	07+
Model Year		-93	-06	
93- Cal HC	1.00	1.00	0.72	0.72
93- Cal NOx	1.00	1.00	0.93	0.93
93- Cal PM	1.00	1.00	0.75	0.72
93- SCAB PM	1.00	0.96	0.75	0.72
93- SCAB HHD PM	1.00	0.96	0.77	0.74
94-06 Cal HC			0.72	0.72
94-06 Cal NOx			0.93	0.93
94-06 Cal PM			0.75	0.72
94-06 Cal HHD HC			0.75	0.75
94-06 Cal HHD NOx			0.94	0.94
94-06 Cal HHD PM			0.77	0.74
07+ Cal HC				0.72
07+ Cal NOx				0.93
07+ Cal PM				0.80
07+ Cal HHD HC				0.75
07+ Cal HHD NOx				0.94
07+ Cal HHD PM				0.82

INVENTORY EFFECTS

The proposed programming changes resulted in a slight decrease in the ROG emissions, mostly due to the diesel HC fuel effects. The net change in ROG statewide is about 8 tpd decrease, about 2% for 2010.

The carbon monoxide emissions estimate for the gasoline fleet was increased slightly by the proposed changes in fuel correction factors. The estimated increase for the year 2010 statewide is 17 tpd or 0.3%.

The proposed fuel correction factor changes resulted in increases in the NOx emission estimates. The overall statewide increase was 28 tpd or 3%, mostly from the diesel fuel correction factor changes.

The proposed fuel correction factor changes resulted in a decrease of the PM emissions estimate, due all to the diesel fleet. The estimated decrease is 1.4 tpd for the year 2010 statewide or 5% overall.

Tables 18 through 22 show a summary of the emission inventory effects due to this programming change in several areas of interest for the five scenario years.

Table 18
Summary of Emissions Changes due to Revised Fuel Correction Factors
Calendar Year 2002

Air Basin	Emission Changes by Pollutant, tons per day				
	HC	CO	NOx	CO_2	PM
Statewide	-12.4	-27.2	35.3	0.0	-1.2
South Coast	-1.1	-2.2	3.1	0.0	-0.1
San Joaquin Valley	-1.0	-2.2	2.4	0.0	-0.1
Sacramento Valley	-3.1	-19.3	3.2	0.0	-0.2
San Diego	-1.3	10.8	8.8	0.0	-0.2
San Francisco Bay Area	-4.3	-10.4	13.3	0.0	-0.4

Table 19
Summary of Emissions Changes due to Revised Fuel Correction Factors
Calendar Year 2005

Air Basin	Emission Changes by Pollutant, tons per day				
	HC	CO	NOx	CO_2	PM
Statewide	-10.5	-4.1	35.2	0.0	-1.4
South Coast	-0.9	-0.5	3.0	0.0	-0.1
San Joaquin Valley	-0.9	0.0	2.5	0.0	-0.1
Sacramento Valley	-2.1	-0.2	6.4	0.0	-0.3
San Diego	-1.7	-0.8	5.7	0.0	-0.2
San Francisco Bay Area	-3.5	-0.9	13.2	0.0	-0.5

Table 20
Summary of Emissions Changes due to Revised Fuel Correction Factors
Calendar Year 2010

Air Basin	Emission Changes by Pollutant, tons per day				
	HC	CO	NOx	CO_2	PM
Statewide	-7.7	17.2	28.1	0.0	-1.4
South Coast	-0.6	1.1	2.2	0.0	-0.1
San Joaquin Valley	-0.6	1.8	2.1	0.0	-0.1
Sacramento Valley	-1.5	4.8	5.4	0.0	-0.3
San Diego	-1.3	1.4	4.6	0.0	-0.3
San Francisco Bay Area	-2.5	7.3	10.3	0.0	-0.4

Table 21
Summary of Emissions Changes due to Revised Fuel Correction Factors
Calendar Year 2015

Air Basin	Emission Changes by Pollutant, tons per day				
	HC	CO	NOx	CO_2	PM
Statewide	-5.6	22.5	17.0	0.0	-1.2
South Coast	-0.4	1.5	1.3	0.0	-0.1
San Joaquin Valley	-0.5	2.1	1.3	0.0	-0.1
Sacramento Valley	-1.0	5.9	3.4	0.0	-0.2
San Diego	-1.0	2.2	2.8	0.0	-0.2
San Francisco Bay Area	-1.8	9.4	6.0	0.0	-0.4

Table 22
Summary of Emissions Changes due to Revised Fuel Correction Factors
Calendar Year 2020

Air Basin	Emission Changes by Pollutant, tons per day				
	HC	CO	NOx	CO_2	PM
Statewide	-4.5	20.7	9.8	0.0	-1.1
South Coast	-0.3	1.4	0.8	0.0	-0.1
San Joaquin Valley	-0.4	1.8	0.8	0.0	-0.1
Sacramento Valley	-0.8	5.1	2.0	0.0	-0.2
San Diego	-0.8	2.2	1.6	0.0	-0.2
San Francisco Bay Area	-1.5	8.5	3.3	0.0	-0.4

Tables 23A through 28B show the inventory calculations for the baseline EMFAC version (April 23, 2002) and for a program-version containing the above fuel-correction factor changes. The results are shown separately for the gasoline-fueled fleet and the diesel-fueled fleet. Scenario years of 2002, 2005, 2010, 2015, and 2020 are shown. The areas shown are Statewide overall, Sacramento Valley Air Basin, San Diego County, San Francisco Bay Air Basin, San Joaquin Valley Air Basin, and South Coast Air Basin.

Table 23A
Statewide Gasoline Inventory Effects

	Baseline Gasoline					Modified Gasoline					Difference, modified minus baseline Gasoline				
	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020
Statewide															
Vehicles	22,409,250	23,894,357	26,464,123	28,834,344	31,267,032	22,409,250	23,894,357	26,464,123	28,834,344	31,267,032	0	0	0	0	0
VMT/1000	773,143	818,658	900,023	972,438	1,046,207	773,143	818,658	900,023	972,438	1,046,207	0	0	0	0	0
Trips	145,772,862	154,551,045	169,751,386	183,437,138	197,314,659	145,772,862	154,551,045	169,751,385	183,437,138	197,314,659	0	0	-1	0	0
Reactive Organic Gas Emissions															
Run Exh	287.6	208.3	130.7	84.6	58.1	284.6	206.4	129.8	84.2	58.0	-3.0	-1.9	-1.0	-0.4	-0.1
Idle Exh	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0
Start Ex	184.2	149.3	102.6	67.8	45.4	182.8	148.5	102.4	67.8	45.5	-1.4	-0.8	-0.3	0.0	0.1
Total Ex	472.3	358.1	233.8	152.8	104.0	468.0	355.3	232.6	152.5	104.0	-4.3	-2.7	-1.2	-0.4	0.0
Diurnal	48.6	44.1	36.9	30.7	26.6	48.6	44.1	36.9	30.7	26.6	0.0	0.0	0.0	0.0	0.0
Hot Soak	42.6	35.9	29.1	24.8	21.7	42.6	35.9	29.1	24.8	21.7	0.0	0.0	0.0	0.0	0.0
Running	231.4	191.7	148.2	119.9	103.9	231.4	191.7	148.2	119.9	103.9	0.0	0.0	0.0	0.0	0.0
Resting	27.1	24.4	22.1	21.0	19.7	27.1	24.4	22.1	21.0	19.7	0.0	0.0	0.0	0.0	0.0
Total	822.1	654.1	470.1	349.3	275.8	817.8	651.4	469.0	348.9	275.8	-4.4	-2.7	-1.2	-0.3	0.0
Carbon Monoxide Emissions															
Run Exh	6,606.9	5,150.0	3,571.2	2,469.7	1,766.9	6587.8	5150.1	3587.7	2489.3	1783.9	-19.2	0.1	16.6	19.6	17.0
Idle Exh	3.0	2.9	2.9	2.8	2.9	3.0	2.9	2.9	2.8	2.9	0.0	0.0	0.0	0.0	0.0
Start Ex	1,849.4	1,506.4	1,092.0	765.5	539.9	1841.5	1502.2	1091.9	767.0	541.5	-7.9	-4.3	-0.1	1.4	1.7
Total Ex	8,459.3	6,659.4	4,666.1	3,238.0	2,309.6	8432.2	6655.1	4682.5	3259.1	2328.3	-27.1	-4.2	16.4	21.0	18.7
Oxides of Nitrogen Emissions															
Run Exh	698.2	515.5	340.7	227.0	161.6	697.1	515.1	341.0	227.6	162.2	-1.2	-0.4	0.3	0.6	0.6
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	131.5	118.5	99.4	75.8	57.1	131.5	118.9	100.3	76.9	58.2	0.1	0.3	0.9	1.1	1.1
Total Ex	829.7	634.0	440.1	302.9	218.7	828.6	634.0	441.3	304.6	220.5	-1.1	0.0	1.2	1.7	1.7
Carbon Dioxide Emissions (000)															
Run Exh	376.1	395.1	438.5	477.1	511.5	376.1	395.1	438.5	477.1	511.5	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Start Ex	13.8	14.2	15.1	16.1	17.1	13.8	14.2	15.1	16.1	17.1	0.0	0.0	0.0	0.0	0.0
Total Ex	390.0	409.4	453.7	493.2	528.7	390.0	409.4	453.7	493.2	528.7	0.0	0.0	0.0	0.0	0.0
PM10 Emissions															
Run Exh	11.0	12.1	14.4	16.5	18.1	11.0	12.1	14.4	16.5	18.1	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	1.3	1.4	1.6	1.7	1.8	1.3	1.4	1.6	1.7	1.8	0.0	0.0	0.0	0.0	0.0
Total Ex	12.2	13.5	16.0	18.2	19.9	12.2	13.5	16.0	18.2	19.9	0.0	0.0	0.0	0.0	0.0
TireWear	6.9	7.3	8.0	8.6	9.3	6.9	7.3	8.0	8.6	9.3	0.0	0.0	0.0	0.0	0.0
BrakeWr	10.7	11.3	12.4	13.5	14.5	10.7	11.3	12.4	13.4	14.5	0.0	0.0	0.0	0.0	0.0
Total	29.8	32.1	36.4	40.3	43.7	29.9	32.1	36.4	40.3	43.7	0.0	0.0	0.0	0.0	0.0
Lead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	5.5	4.0	4.4	4.8	5.1	5.5	4.0	4.4	4.8	5.1	0.0	0.0	0.0	0.0	0.0
Fuel Consumption (000 gallons)															
Gasoline	41,451.7	43,106.6	47,280.7	51,070.4	54,531.8	41,445.9	43,105.0	47,282.9	51,073.7	54,534.9	-5.8	-1.6	2.2	3.3	3.0
Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 23B
Statewide Diesel Inventory Effects

	Baseline Diesel					Modified Diesel					Difference, modified minus baseline Diesel				
	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020
Statewide															
Vehicles	723,566	746,294	742,862	742,157	751,959	723,566	746,294	742,862	742,157	751,959	0	0	0	0	0
VMT/1000	49,488	51,799	54,849	57,891	60,589	49,488	51,799	54,849	57,891	60,589	0	0	0	0	0
Trips	8,095,141	8,587,262	8,996,461	9,329,049	9,713,464	8,095,141	8,587,263	8,996,461	9,329,049	9,713,464	0	1	0	0	0
Reactive Organic Gas Emissions															
Run Exh	29.3	28.0	23.2	18.1	14.7	21.7	20.7	17.1	13.3	10.9	-7.6	-7.3	-6.1	-4.7	-3.9
Idle Exh	1.5	1.6	1.8	2.0	2.2	1.1	1.2	1.4	1.5	1.6	-0.4	-0.4	-0.5	-0.5	-0.5
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	30.8	29.7	25.0	20.1	16.9	22.8	21.9	18.5	14.8	12.5	-8.0	-7.8	-6.5	-5.3	-4.4
Diurnal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hot Soak	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Running	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Resting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	30.8	29.7	25.0	20.1	16.9	22.8	21.9	18.5	14.8	12.5	-8.0	-7.8	-6.5	-5.3	-4.4
Carbon Monoxide Emissions															
Run Exh	131.1	124.5	106.5	89.9	81.3	131.1	124.5	106.5	89.9	81.3	0.0	0.0	0.0	0.0	0.0
Idle Exh	9.0	9.7	10.9	11.9	12.9	9.0	9.7	10.9	11.9	12.9	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	140.1	134.2	117.4	101.9	94.2	140.1	134.2	117.4	101.9	94.2	0.0	0.0	0.0	0.0	0.0
Oxides of Nitrogen Emissions															
Run Exh	739.0	676.9	514.5	324.4	209.0	777.1	714.1	543.6	342.1	219.8	38.1	37.1	29.1	17.7	10.7
Idle Exh	27.6	29.9	33.4	36.5	39.5	25.8	28.0	31.3	34.2	37.0	-1.7	-1.9	-2.1	-2.3	-2.5
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	766.6	706.8	547.9	360.9	248.6	802.9	742.0	574.8	376.3	256.8	36.3	35.2	27.0	15.4	8.2
Carbon Dioxide Emissions (000)															
Run Exh	86.3	92.5	104.5	115.1	123.3	86.3	92.5	104.5	115.1	123.3	0.0	0.0	0.0	0.0	0.0
Idle Exh	1.4	1.5	1.7	1.9	2.0	1.4	1.5	1.7	1.9	2.0	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	87.7	94.0	106.1	116.9	125.4	87.7	94.0	106.1	116.9	125.4	0.0	0.0	0.0	0.0	0.0
PM10 Emissions															
Run Exh	15.7	14.4	11.1	8.3	6.7	14.7	13.2	9.9	7.3	5.7	-1.0	-1.3	-1.2	-1.1	-1.0
Idle Exh	0.8	0.7	0.6	0.6	0.5	0.6	0.6	0.5	0.4	0.4	-0.2	-0.2	-0.2	-0.1	-0.1
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	16.5	15.1	11.7	8.9	7.2	15.3	13.7	10.3	7.7	6.2	-1.2	-1.4	-1.4	-1.2	-1.1
TireWear	1.3	1.3	1.5	1.7	1.8	1.3	1.3	1.5	1.7	1.8	0.0	0.0	0.0	0.0	0.0
BrakeWr	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.8	0.8	0.8	0.0	0.0	0.0	0.0	0.0
Total	18.5	17.2	13.9	11.3	9.9	17.2	15.8	12.6	10.1	8.8	-1.2	-1.4	-1.4	-1.2	-1.1
Lead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	7.6	8.2	1.0	1.1	1.2	7.6	8.2	1.0	1.1	1.2	0.0	0.0	0.0	0.0	0.0
Fuel Consumption (000 gallons)															
Gasoline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	7,890.3	8,462.7	9,552.6	10,523.5	11,280.1	7,890.3	8,462.7	9,552.6	10,523.5	11,280.1	0.0	0.0	0.0	0.0	0.0

Table 24A
Sacramento Valley AB Gasoline Inventory Effects

	Baseline Gasoline					Modified Gasoline					Difference, modified minus baseline Gasoline				
	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020
Sacramento Valley AB															
Vehicles	1,670,133	1,828,104	2,071,313	2,328,533	2,566,443	1,670,133	1,828,104	2,071,323	2,328,533	2,566,443	0	0	10	0	0
VMT/1000	52,932	57,807	65,618	73,397	79,579	52,932	57,807	65,618	73,397	79,579	0	0	0	0	0
Trips	10,936,808	11,845,761	13,251,572	14,721,017	16,010,688	10,936,808	11,845,761	13,251,572	14,721,017	16,010,688	0	0	0	0	0
Reactive Organic Gas Emissions															
Run Exh	20.1	14.8	9.0	5.5	3.7	19.9	14.6	8.9	5.5	3.7	-0.2	-0.1	-0.1	-0.1	0.0
Idle Exh	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	14.7	12.0	8.1	5.2	3.4	14.6	11.9	8.1	5.2	3.4	-0.1	-0.1	0.0	0.0	0.0
Total Ex	34.9	26.8	17.1	10.7	7.1	34.6	26.6	17.0	10.7	7.1	-0.3	-0.2	-0.1	0.0	0.0
Diurnal	5.2	4.8	4.0	3.3	2.8	5.2	4.8	4.0	3.3	2.8	0.0	0.0	0.0	0.0	0.0
Hot Soak	4.4	3.8	3.1	2.7	2.3	4.4	3.8	3.1	2.7	2.3	0.0	0.0	0.0	0.0	0.0
Running	19.9	16.9	12.9	10.3	8.8	19.9	16.9	12.9	10.3	8.8	0.0	0.0	0.0	0.0	0.0
Resting	2.4	2.2	2.0	1.8	1.7	2.4	2.2	2.0	1.8	1.7	0.0	0.0	0.0	0.0	0.0
Total	66.9	54.5	39.1	28.8	22.7	66.5	54.3	39.0	28.8	22.7	-0.3	-0.2	-0.1	0.0	0.0
Carbon Monoxide Emissions															
Run Exh	488.4	384.0	259.9	174.5	123.5	486.9	383.9	261.0	175.8	124.7	-1.6	-0.1	1.1	1.3	1.2
Idle Exh	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Start Ex	149.8	122.1	86.2	58.6	39.9	149.1	121.7	86.2	58.7	40.0	-0.7	-0.4	0.0	0.1	0.1
Total Ex	638.5	506.4	346.4	233.3	163.7	636.2	505.9	347.4	234.6	164.9	-2.2	-0.5	1.1	1.3	1.3
Oxides of Nitrogen Emissions															
Run Exh	48.6	36.2	23.5	15.3	10.8	48.5	36.2	23.5	15.4	10.8	-0.1	0.0	0.0	0.0	0.0
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	10.1	9.2	7.5	5.7	4.2	10.1	9.2	7.6	5.8	4.3	0.0	0.0	0.1	0.1	0.1
Total Ex	58.6	45.4	31.0	21.0	15.0	58.5	45.4	31.1	21.1	15.1	-0.1	0.1	0.1	0.1	0.2
Carbon Dioxide Emissions (000)															
Run Exh	26.1	28.4	32.2	35.9	39.1	26.1	28.4	32.2	35.9	39.1	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	1.0	1.1	1.2	1.3	1.4	1.0	1.1	1.2	1.3	1.4	0.0	0.0	0.0	0.0	0.0
Total Ex	27.2	29.5	33.4	37.2	40.5	27.2	29.5	33.4	37.2	40.5	0.0	0.0	0.0	0.0	0.0
PM10 Emissions															
Run Exh	0.7	0.7	0.9	1.0	1.1	0.7	0.7	0.9	1.0	1.1	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Ex	0.8	0.9	1.0	1.1	1.3	0.8	0.9	1.0	1.1	1.3	0.0	0.0	0.0	0.0	0.0
TireWear	0.5	0.5	0.6	0.6	0.7	0.5	0.5	0.6	0.6	0.7	0.0	0.0	0.0	0.0	0.0
BrakeWr	0.7	0.8	0.9	1.0	1.1	0.7	0.8	0.9	1.0	1.1	0.0	0.0	0.0	0.0	0.0
Total	2.0	2.2	2.5	2.8	3.1	2.0	2.2	2.5	2.8	3.1	0.0	0.0	0.0	0.0	0.0
Lead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	0.4	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.0	0.0	0.0	0.0	0.0
Fuel Consumption (000 gallons)															
Gasoline	2,896.5	3,109.5	3,483.2	3,851.0	4,174.7	2896.0	3109.3	3483.3	3851.2	4174.9	-0.5	-0.1	0.1	0.2	0.2
Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 24B
Sacramento Valley AB Diesel Inventory Effects

	Baseline Diesel					Modified Diesel					Difference, modified minus baseline Diesel				
	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020
Vehicles	74,545	74,069	68,557	64,042	62,155	74,545	74,069	68,557	64,042	62,155	0	0	0	0	0
VMT/1000	4,622	4,604	4,361	4,239	4,303	4,622	4,604	4,361	4,239	4,303	0	0	0	0	0
Trips	812,015	820,480	792,161	762,684	751,616	812,015	820,480	792,161	762,684	751,616	0	0	0	0	0
Reactive Organic Gas Emissions															
Run Exh	2.6	2.4	1.9	1.4	1.1	1.9	1.8	1.4	1.0	0.8	-0.7	-0.6	-0.5	-0.3	-0.3
Idle Exh	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	-0.1	0.0	-0.1
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	2.8	2.6	2.1	1.5	1.2	2.1	1.9	1.5	1.1	0.9	-0.7	-0.7	-0.5	-0.4	-0.3
Diurnal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hot Soak	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Running	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Resting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	2.8	2.6	2.1	1.5	1.2	2.1	1.9	1.5	1.1	0.9	-0.7	-0.7	-0.5	-0.4	-0.3
Carbon Monoxide Emissions															
Run Exh	11.6	10.6	8.6	6.8	5.8	11.6	10.6	8.6	6.8	5.8	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.8	0.9	0.9	0.9	1.0	0.8	0.9	0.9	0.9	1.0	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	12.5	11.5	9.5	7.7	6.8	12.5	11.5	9.5	7.7	6.8	0.0	0.0	0.0	0.0	0.0
Oxides of Nitrogen Emissions															
Run Exh	62.7	54.8	39.0	23.8	14.6	66.0	57.9	41.3	25.2	15.4	3.3	3.1	2.3	1.4	0.8
Idle Exh	2.6	2.7	2.8	2.9	3.0	2.4	2.5	2.6	2.7	2.8	-0.2	-0.2	-0.2	-0.2	-0.2
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	65.3	57.5	41.8	26.7	17.6	68.4	60.4	43.9	27.9	18.2	3.2	2.9	2.1	1.2	0.6
Carbon Dioxide Emissions (000)															
Run Exh	7.7	8.0	8.0	8.2	8.7	7.7	8.0	8.0	8.2	8.7	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	7.9	8.1	8.2	8.4	8.8	7.9	8.1	8.2	8.4	8.8	0.0	0.0	0.0	0.0	0.0
PM10 Emissions															
Run Exh	1.5	1.3	0.9	0.6	0.5	1.4	1.2	0.8	0.6	0.4	-0.1	-0.1	-0.1	-0.1	-0.1
Idle Exh	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	1.5	1.3	1.0	0.7	0.6	1.4	1.2	0.9	0.6	0.5	-0.1	-0.1	-0.1	-0.1	-0.1
TireWear	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
BrakeWr	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total	1.7	1.5	1.2	0.9	0.7	1.6	1.4	1.1	0.8	0.6	-0.1	-0.1	-0.1	-0.1	-0.1
Lead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	0.7	0.7	0.1	0.1	0.1	0.7	0.7	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Fuel Consumption (000 gallons)															
Gasoline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	709.7	729.4	737.1	754.4	794.3	709.7	729.4	737.1	754.4	794.3	0.0	0.0	0.0	0.0	0.0

Table 25A
San Diego County Gasoline Inventory Effects

Tons per day	Baseline Gasoline 2002	2005	2010	2015	2020	Modified Gasoline 2002	2005	2010	2015	2020	Difference, modified minus baseline Gasoline 2002	2005	2010	2015	2020
San Diego County															
Vehicles	1,940,068	2,105,298	2,277,811	2,472,344	2,610,248	1,940,068	2,105,298	2,277,811	2,472,344	2,610,248	0	0	0	0	0
VMT/1000	73,105	78,479	83,033	89,200	92,819	73,105	78,479	83,033	89,200	92,819	0	0	0	0	0
Trips	12,518,281	13,522,465	14,531,009	15,675,878	16,439,085	12,518,281	13,522,465	14,530,999	15,675,878	16,439,085	0	0	-10	0	0
Reactive Organic Gas Emissions															
Run Exh	26.8	19.6	12.0	7.9	5.8	26.4	19.4	12.0	7.9	5.8	-0.3	-0.2	-0.1	-0.1	0.0
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	15.4	12.7	8.9	6.1	4.3	15.3	12.6	8.9	6.1	4.3	-0.1	-0.1	0.0	0.0	0.0
Total Ex	42.1	32.3	21.0	14.0	10.1	41.7	32.0	20.9	14.0	10.1	-0.4	-0.2	-0.1	0.0	0.0
Diurnal	3.8	3.5	2.9	2.5	2.2	3.8	3.5	2.9	2.5	2.2	0.0	0.0	0.0	0.0	0.0
Hot Soak	3.1	2.6	2.2	1.9	1.7	3.1	2.6	2.2	1.9	1.7	0.0	0.0	0.0	0.0	0.0
Running	17.7	14.8	11.6	9.5	8.4	17.7	14.8	11.6	9.5	8.4	0.0	0.0	0.0	0.0	0.0
Resting	2.1	1.9	1.7	1.7	1.6	2.1	1.9	1.7	1.7	1.6	0.0	0.0	0.0	0.0	0.0
Total	68.9	55.1	39.4	29.6	23.9	68.5	54.9	39.4	29.6	23.9	-0.4	-0.2	-0.1	0.0	0.0
Carbon Monoxide Emissions															
Run Exh	599.9	475.9	324.0	222.2	162.1	598.4	476.3	325.7	224.1	163.7	-1.5	0.3	1.8	1.9	1.6
Idle Exh	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Start Ex	152.2	127.0	94.4	68.4	50.1	151.6	126.7	94.5	68.6	50.2	-0.6	-0.3	0.1	0.2	0.2
Total Ex	752.3	603.1	418.6	290.8	212.4	750.2	603.2	420.4	292.9	214.1	-2.1	0.1	1.8	2.1	1.7
Oxides of Nitrogen Emissions															
Run Exh	65.0	48.7	32.0	21.6	15.7	64.9	48.6	32.1	21.6	15.8	-0.1	-0.1	0.0	0.0	0.1
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	11.2	10.3	8.7	6.7	5.0	11.2	10.4	8.8	6.8	5.2	0.0	0.0	0.1	0.1	0.1
Total Ex	76.2	59.0	40.7	28.3	20.8	76.1	59.0	40.8	28.4	20.9	-0.1	0.0	0.1	0.1	0.2
Carbon Dioxide Emissions (000)															
Run Exh	36.8	39.2	41.0	43.7	45.3	36.8	39.2	41.0	43.7	45.3	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	1.2	1.2	1.3	1.3	1.4	1.2	1.2	1.3	1.3	1.4	0.0	0.0	0.0	0.0	0.0
Total Ex	38.0	40.4	42.3	45.0	46.8	38.0	40.4	42.3	45.0	46.8	0.0	0.0	0.0	0.0	0.0
PM10 Emissions															
Run Exh	1.1	1.3	1.4	1.6	1.7	1.1	1.3	1.4	1.6	1.7	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Total Ex	1.2	1.4	1.6	1.7	1.9	1.2	1.4	1.6	1.7	1.9	0.0	0.0	0.0	0.0	0.0
TireWear	0.6	0.7	0.7	0.8	0.8	0.6	0.7	0.7	0.8	0.8	0.0	0.0	0.0	0.0	0.0
BrakeWr	1.0	1.1	1.1	1.2	1.3	1.0	1.1	1.1	1.2	1.3	0.0	0.0	0.0	0.0	0.0
Total	2.9	3.2	3.5	3.8	4.0	2.9	3.2	3.5	3.8	4.0	0.0	0.0	0.0	0.0	0.0
Lead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	0.5	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.5	0.0	0.0	0.0	0.0	0.0
Fuel Consumption (000 gallons)															
Gasoline	4,024.6	4,244.5	4,407.8	4,663.6	4,826.1	4024.1	4244.4	4408.0	4663.9	4826.4	-0.5	-0.1	0.3	0.3	0.3
Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 25B
San Diego County Diesel Inventory Effects

	Baseline Diesel					Modified Diesel					Difference, modified minus baseline Diesel				
	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020
Vehicles	53,008	55,370	54,695	55,008	54,700	53,008	55,370	54,695	55,008	54,700	0	0	0	0	0
VMT/1000	3,734	4,009	4,273	4,504	4,535	3,734	4,009	4,273	4,504	4,535	0	0	0	0	0
Trips	558,919	604,204	629,266	661,065	680,780	558,919	604,204	629,266	661,065	680,780	0	0	0	0	0
Reactive Organic Gas Emissions															
Run Exh	2.4	2.3	1.9	1.5	1.2	1.7	1.7	1.4	1.1	0.9	-0.6	-0.6	-0.5	-0.4	-0.3
Idle Exh	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	-0.1	-0.1	-0.1
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	2.5	2.4	2.0	1.7	1.4	1.8	1.8	1.5	1.2	1.0	-0.6	-0.6	-0.5	-0.4	-0.4
Diurnal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hot Soak	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Running	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Resting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	2.5	2.4	2.0	1.7	1.4	1.8	1.8	1.5	1.2	1.0	-0.6	-0.6	-0.5	-0.4	-0.4
Carbon Monoxide Emissions															
Run Exh	10.3	9.9	8.5	7.3	6.6	10.3	9.9	8.5	7.3	6.6	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.7	0.7	0.8	0.9	1.0	0.7	0.7	0.8	0.9	1.0	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	11.0	10.7	9.3	8.2	7.6	11.0	10.7	9.3	8.2	7.6	0.0	0.0	0.0	0.0	0.0
Oxides of Nitrogen Emissions															
Run Exh	51.6	48.6	37.1	24.4	16.5	54.3	51.3	39.3	25.8	17.4	2.7	2.7	2.1	1.4	0.9
Idle Exh	2.0	2.3	2.5	2.8	3.0	1.9	2.1	2.4	2.6	2.8	-0.1	-0.1	-0.2	-0.2	-0.2
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	53.7	50.9	39.6	27.2	19.5	56.2	53.4	41.6	28.4	20.2	2.5	2.5	2.0	1.2	0.7
Carbon Dioxide Emissions (000)															
Run Exh	6.4	7.0	8.1	8.9	9.2	6.4	7.0	8.1	8.9	9.2	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	6.5	7.2	8.2	9.1	9.4	6.5	7.2	8.2	9.1	9.4	0.0	0.0	0.0	0.0	0.0
PM10 Emissions															
Run Exh	1.2	1.2	0.9	0.7	0.6	1.1	1.1	0.8	0.6	0.5	-0.1	-0.1	-0.1	-0.1	-0.1
Idle Exh	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	1.3	1.2	0.9	0.7	0.6	1.2	1.1	0.8	0.6	0.5	-0.1	-0.1	-0.1	-0.1	-0.1
TireWear	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
BrakeWr	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total	1.4	1.4	1.1	0.9	0.8	1.4	1.3	1.0	0.8	0.7	-0.1	-0.1	-0.1	-0.1	-0.1
Lead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	0.6	0.6	0.1	0.1	0.1	0.6	0.6	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Fuel Consumption (000 gallons)															
Gasoline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	583.0	644.9	740.6	816.5	842.4	583.0	644.9	740.6	816.5	842.4	0.0	0.0	0.0	0.0	0.0

Table 26A
San Francisco Bay AB Gasoline Inventory Effects

Tons per day	Baseline Gasoline 2002	2005	2010	2015	2020	Modified Gasoline 2002	2005	2010	2015	2020	Difference, modified minus baseline Gasoline 2002	2005	2010	2015	2020
San Francisco Bay AB															
Vehicles	4,621,151	4,909,217	5,568,773	5,958,341	6,396,387	4,621,151	4,909,218	5,568,773	5,958,341	6,396,387	0	1	0	0	0
VMT/1000	154,312	162,388	182,625	191,747	203,522	154,312	162,388	182,625	191,747	203,522	0	0	0	0	0
Trips	29,822,672	31,597,704	35,559,084	37,670,576	40,018,472	29,822,672	31,597,704	35,559,084	37,670,576	40,018,472	0	0	0	0	0
Reactive Organic Gas Emissions															
Run Exh	57.6	45.3	32.3	20.0	12.7	56.9	44.9	32.1	19.9	12.7	-0.6	-0.4	-0.2	0.0	0.0
Idle Exh	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Start Ex	39.7	34.1	24.1	15.5	10.1	39.4	34.0	24.1	15.6	10.1	-0.3	-0.2	0.0	0.0	0.0
Total Ex	97.3	79.5	56.5	35.6	22.9	96.4	78.9	56.3	35.6	22.9	-0.9	-0.6	-0.2	0.0	0.0
Diurnal	8.5	7.7	6.5	5.4	4.7	8.5	7.7	6.5	5.4	4.7	0.0	0.0	0.0	0.0	0.0
Hot Soak	7.7	6.4	5.3	4.5	3.9	7.7	6.4	5.3	4.5	3.9	0.0	0.0	0.0	0.0	0.0
Running	45.6	37.5	29.1	23.3	20.0	45.6	37.5	29.1	23.3	20.0	0.0	0.0	0.0	0.0	0.0
Resting	4.7	4.2	4.0	3.8	3.6	4.7	4.2	4.0	3.8	3.6	0.0	0.0	0.0	0.0	0.0
Total	163.8	135.3	101.2	72.6	55.1	162.9	134.8	101.1	72.5	55.1	-0.9	-0.6	-0.2	0.0	0.0
Carbon Monoxide Emissions															
Run Exh	1,257.7	1,030.1	756.8	508.5	351.6	1254.4	1030.6	761.1	513.3	355.6	-3.3	0.5	4.3	4.8	4.0
Idle Exh	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0
Start Ex	394.3	340.1	253.0	175.1	121.1	392.6	339.4	253.4	175.8	121.8	-1.7	-0.7	0.3	0.7	0.6
Total Ex	1,652.5	1,370.7	1,010.3	684.1	473.1	1647.5	1370.5	1014.9	689.6	477.8	-5.0	-0.2	4.7	5.5	4.7
Oxides of Nitrogen Emissions															
Run Exh	144.7	115.6	81.6	53.8	37.0	144.5	115.7	82.0	54.3	37.4	-0.2	0.0	0.4	0.5	0.4
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	27.5	26.2	23.0	17.4	12.6	27.5	26.3	23.3	17.8	12.9	0.0	0.2	0.3	0.4	0.4
Total Ex	172.2	141.8	104.6	71.2	49.6	171.9	142.0	105.3	72.1	50.4	-0.2	0.2	0.8	0.8	0.8
Carbon Dioxide Emissions (000)															
Run Exh	74.3	77.4	93.8	100.0	106.1	74.3	77.4	93.8	100.0	106.1	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	2.8	2.9	3.2	3.3	3.5	2.8	2.9	3.2	3.3	3.5	0.0	0.0	0.0	0.0	0.0
Total Ex	77.1	80.3	97.0	103.4	109.6	77.1	80.3	97.0	103.4	109.6	0.0	0.0	0.0	0.0	0.0
PM10 Emissions															
Run Exh	2.1	2.3	3.1	3.6	4.0	2.1	2.3	3.1	3.6	4.0	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	0.2	0.3	0.3	0.3	0.4	0.2	0.3	0.3	0.3	0.4	0.0	0.0	0.0	0.0	0.0
Total Ex	2.3	2.6	3.4	4.0	4.3	2.3	2.6	3.4	4.0	4.3	0.0	0.0	0.0	0.0	0.0
TireWear	1.4	1.5	1.6	1.7	1.8	1.4	1.5	1.6	1.7	1.8	0.0	0.0	0.0	0.0	0.0
BrakeWr	2.1	2.2	2.5	2.7	2.8	2.1	2.2	2.5	2.7	2.8	0.0	0.0	0.0	0.0	0.0
Total	5.8	6.2	7.6	8.3	8.9	5.8	6.2	7.6	8.3	8.9	0.0	0.0	0.0	0.0	0.0
Lead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	1.1	0.8	0.9	1.0	1.1	1.1	0.8	1.0	1.0	1.1	0.0	0.0	0.0	0.0	0.0
Fuel Consumption (000 gallons)															
Gasoline	8,189.2	8,469.8	10,115.5	10,706.4	11,304.0	8188.1	8469.6	10116.2	10707.3	11304.7	-1.1	-0.2	0.7	0.9	0.8
Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 26B
San Francisco Bay AB Diesel Inventory Effects

	Baseline Diesel					Modified Diesel					Difference, modified minus baseline Diesel				
	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020
Vehicles	136,465	139,582	139,248	134,482	132,256	136,465	139,582	139,248	134,482	132,256	0	0	0	0	0
VMT/1000	9,384	9,712	10,176	9,982	9,896	9,384	9,712	10,176	9,982	9,896	0	0	0	0	0
Trips	1,577,636	1,665,480	1,739,737	1,718,187	1,705,113	1,577,636	1,665,480	1,739,737	1,718,187	1,705,113	0	0	0	0	0
Reactive Organic Gas Emissions															
Run Exh	5.8	5.6	4.7	3.6	2.8	4.3	4.1	3.5	2.6	2.1	-1.5	-1.5	-1.3	-1.0	-0.8
Idle Exh	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	-0.1	-0.1	-0.1	-0.1	-0.1
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	6.0	5.8	5.0	3.9	3.2	4.4	4.3	3.7	2.8	2.3	-1.6	-1.5	-1.3	-1.0	-0.8
Diurnal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hot Soak	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Running	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Resting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	6.0	5.8	5.0	3.9	3.2	4.4	4.3	3.7	2.8	2.3	-1.6	-1.5	-1.3	-1.0	-0.8
Carbon Monoxide Emissions															
Run Exh	25.2	24.2	21.3	17.5	15.2	25.2	24.2	21.3	17.5	15.2	0.0	0.0	0.0	0.0	0.0
Idle Exh	1.5	1.6	1.8	1.9	1.9	1.5	1.6	1.8	1.9	1.9	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	26.7	25.8	23.1	19.3	17.1	26.7	25.8	23.1	19.3	17.1	0.0	0.0	0.0	0.0	0.0
Oxides of Nitrogen Emissions															
Run Exh	138.5	126.4	97.2	62.2	41.2	145.3	132.9	102.1	65.1	42.8	6.8	6.5	4.9	2.9	1.6
Idle Exh	4.5	4.9	5.5	5.7	5.9	4.2	4.6	5.1	5.3	5.5	-0.3	-0.3	-0.3	-0.4	-0.4
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	143.0	131.3	102.6	67.9	47.0	149.5	137.5	107.2	70.5	48.3	6.5	6.2	4.6	2.5	1.3
Carbon Dioxide Emissions (000)															
Run Exh	16.6	17.5	19.5	19.9	20.1	16.6	17.5	19.5	19.9	20.1	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.2	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	16.8	17.8	19.8	20.1	20.4	16.8	17.8	19.8	20.1	20.4	0.0	0.0	0.0	0.0	0.0
PM10 Emissions															
Run Exh	3.1	2.8	2.2	1.6	1.3	2.8	2.6	2.0	1.4	1.1	-0.2	-0.3	-0.3	-0.2	-0.2
Idle Exh	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	3.2	2.9	2.3	1.7	1.4	2.9	2.7	2.1	1.5	1.2	-0.2	-0.3	-0.3	-0.2	-0.2
TireWear	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0
BrakeWr	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total	3.6	3.3	2.7	2.1	1.8	3.3	3.0	2.5	1.9	1.6	-0.3	-0.3	-0.3	-0.2	-0.2
Lead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	1.5	1.6	0.2	0.2	0.2	1.5	1.6	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Fuel Consumption (000 gallons)															
Gasoline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	1,513.8	1,600.7	1,782.4	1,811.6	1,839.1	1,513.8	1,600.7	1,782.4	1,811.6	1,839.1	0.0	0.0	0.0	0.0	0.0

Table 27A
San Joaquin Valley AB Gasoline Inventory Effects

Tons per day	Baseline Gasoline 2002	2005	2010	2015	2020	Modified Gasoline 2002	2005	2010	2015	2020	Difference, modified minus baseline Gasoline 2002	2005	2010	2015	2020
San Joaquin Valley AB															
Vehicles	2,026,477	2,221,866	2,537,239	2,886,737	3,232,729	2,026,477	2,221,866	2,537,240	2,886,737	3,232,729	0	0	1	0	0
VMT/1000	78,195	85,843	98,613	111,991	124,262	78,195	85,843	98,613	111,991	124,262	0	0	0	0	0
Trips	13,367,053	14,572,488	16,534,736	18,708,835	20,827,516	13,367,053	14,572,488	16,534,736	18,708,835	20,827,516	0	0	0	0	0
Reactive Organic Gas Emissions															
Run Exh	34.0	24.9	15.2	9.7	6.7	33.6	24.7	15.1	9.7	6.7	-0.3	-0.2	-0.1	-0.1	0.0
Idle Exh	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Start Ex	18.7	15.2	10.3	6.8	4.5	18.6	15.1	10.3	6.8	4.5	-0.2	-0.1	0.0	0.0	0.1
Total Ex	52.8	40.2	25.6	16.6	11.3	52.3	39.9	25.5	16.5	11.2	-0.5	-0.3	-0.1	0.0	0.0
Diurnal	6.3	5.8	4.7	3.8	3.2	6.3	5.8	4.7	3.8	3.2	0.0	0.0	0.0	0.0	0.0
Hot Soak	5.0	4.3	3.5	2.9	2.6	5.0	4.3	3.5	2.9	2.6	0.0	0.0	0.0	0.0	0.0
Running	23.2	19.3	14.7	11.9	10.6	23.2	19.3	14.7	11.9	10.6	0.0	0.0	0.0	0.0	0.0
Resting	3.2	2.9	2.5	2.2	2.0	3.2	2.9	2.5	2.2	2.0	0.0	0.0	0.0	0.0	0.0
Total	90.6	72.4	50.9	37.5	29.6	90.1	72.1	50.8	37.4	29.7	-0.5	-0.3	-0.1	0.0	0.0
Carbon Monoxide Emissions															
Run Exh	801.2	630.4	426.7	289.6	207.0	798.5	630.0	428.1	291.5	208.8	-2.7	-0.4	1.5	1.9	1.8
Idle Exh	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.0
Start Ex	188.4	154.6	110.5	77.4	54.3	187.6	154.1	110.4	77.4	54.5	-0.9	-0.5	-0.1	0.1	0.1
Total Ex	990.0	785.4	537.5	367.4	261.8	986.5	784.6	538.9	369.3	263.8	-3.5	-0.8	1.3	2.0	2.0
Oxides of Nitrogen Emissions															
Run Exh	76.8	57.4	37.5	25.0	17.9	76.7	57.3	37.5	25.0	18.0	-0.1	0.0	0.1	0.1	0.1
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	12.6	11.7	10.2	8.2	6.5	12.7	11.8	10.3	8.4	6.7	0.0	0.1	0.1	0.2	0.2
Total Ex	89.5	69.1	47.7	33.1	24.4	89.4	69.1	47.9	33.4	24.7	-0.1	0.0	0.2	0.3	0.3
Carbon Dioxide Emissions (000)															
Run Exh	38.8	42.3	48.1	54.4	60.4	38.8	42.3	48.1	54.4	60.4	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	1.3	1.3	1.5	1.6	1.8	1.3	1.3	1.5	1.6	1.8	0.0	0.0	0.0	0.0	0.0
Total Ex	40.1	43.7	49.6	56.0	62.2	40.1	43.7	49.6	56.0	62.2	0.0	0.0	0.0	0.0	0.0
PM10 Emissions															
Run Exh	1.2	1.3	1.5	1.7	2.0	1.2	1.3	1.5	1.7	2.0	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Total Ex	1.3	1.5	1.7	1.9	2.2	1.3	1.5	1.7	1.9	2.2	0.0	0.0	0.0	0.0	0.0
TireWear	0.7	0.8	0.9	1.0	1.1	0.7	0.8	0.9	1.0	1.1	0.0	0.0	0.0	0.0	0.0
BrakeWr	1.1	1.2	1.3	1.6	1.7	1.1	1.2	1.3	1.6	1.7	0.0	0.0	0.0	0.0	0.0
Total	3.1	3.4	3.9	4.5	5.0	3.1	3.4	3.9	4.5	5.0	0.0	0.0	0.0	0.0	0.0
Lead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	0.6	0.4	0.5	0.5	0.6	0.6	0.4	0.5	0.5	0.6	0.0	0.0	0.0	0.0	0.0
Fuel Consumption (000 gallons)															
Gasoline	4,283.2	4,610.6	5,178.7	5,801.3	6,419.1	4282.5	4610.4	5178.9	5801.7	6419.4	-0.7	-0.2	0.2	0.4	0.3
Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 27B
San Joaquin Valley AB Diesel Inventory Effects

	Baseline Diesel					Modified Diesel					Difference, modified minus baseline Diesel				
	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020
Vehicles	91,165	96,368	98,884	103,419	109,250	91,165	96,368	98,884	103,419	109,250	0	0	0	0	0
VMT/1000	7,506	8,045	8,764	9,861	10,887	7,506	8,045	8,764	9,861	10,887	0	0	0	0	0
Trips	1,004,299	1,099,472	1,194,257	1,303,510	1,417,240	1,004,299	1,099,472	1,194,257	1,303,510	1,417,240	0	0	0	0	0
Reactive Organic Gas Emissions															
Run Exh	5.3	5.1	4.3	3.3	2.7	3.9	3.8	3.2	2.5	2.0	-1.4	-1.3	-1.1	-0.9	-0.7
Idle Exh	0.2	0.3	0.3	0.3	0.4	0.2	0.2	0.2	0.2	0.3	-0.1	-0.1	-0.1	-0.1	-0.1
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	5.5	5.4	4.6	3.6	3.1	4.1	4.0	3.4	2.7	2.3	-1.4	-1.4	-1.2	-0.9	-0.8
Diurnal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hot Soak	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Running	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Resting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	5.5	5.4	4.6	3.6	3.1	4.1	4.0	3.4	2.7	2.3	-1.4	-1.4	-1.2	-0.9	-0.8
Carbon Monoxide Emissions															
Run Exh	22.8	22.0	19.1	16.3	15.3	22.8	22.0	19.1	16.3	15.3	0.0	0.0	0.0	0.0	0.0
Idle Exh	1.4	1.5	1.7	2.0	2.2	1.4	1.5	1.7	2.0	2.2	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	24.2	23.5	20.9	18.2	17.4	24.2	23.5	20.9	18.2	17.4	0.0	0.0	0.0	0.0	0.0
Oxides of Nitrogen Emissions															
Run Exh	112.3	104.6	79.6	49.9	31.5	118.4	110.5	84.4	52.9	33.3	6.1	6.0	4.8	3.0	1.8
Idle Exh	4.2	4.7	5.3	6.0	6.6	4.0	4.4	5.0	5.6	6.2	-0.3	-0.3	-0.3	-0.4	-0.4
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	116.5	109.2	84.9	55.9	38.1	122.3	114.9	89.3	58.4	39.5	5.8	5.7	4.4	2.6	1.4
Carbon Dioxide Emissions (000)															
Run Exh	13.5	14.8	17.1	20.0	22.5	13.5	14.8	17.1	20.0	22.5	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	13.7	15.1	17.3	20.3	22.8	13.7	15.1	17.3	20.3	22.8	0.0	0.0	0.0	0.0	0.0
PM10 Emissions															
Run Exh	2.6	2.4	1.9	1.4	1.2	2.4	2.2	1.7	1.2	1.0	-0.2	-0.2	-0.2	-0.2	-0.2
Idle Exh	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	2.7	2.5	2.0	1.5	1.3	2.5	2.3	1.7	1.3	1.0	-0.2	-0.2	-0.3	-0.2	-0.2
TireWear	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.0	0.0	0.0	0.0	0.0
BrakeWr	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total	3.0	2.9	2.3	1.9	1.7	2.8	2.6	2.1	1.7	1.5	-0.2	-0.3	-0.2	-0.2	-0.2
Lead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	1.2	1.3	0.2	0.2	0.2	1.2	1.3	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Fuel Consumption (000 gallons)															
Gasoline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	1,235.7	1,357.1	1,560.3	1,823.7	2,054.1	1,235.7	1,357.1	1,560.3	1,823.7	2,054.1	0.0	0.0	0.0	0.0	0.0

Table 28A
South Coast AB Gasoline Inventory Effects

Tons per day South Coast AB	Baseline Gasoline 2002	2005	2010	2015	2020	Modified Gasoline 2002	2005	2010	2015	2020	Difference, modified minus baseline Gasoline 2002	2005	2010	2015	2020
Vehicles	8,970,858	9,390,666	10,123,658	10,855,280	11,640,354	8,970,858	9,390,666	10,123,658	10,855,280	11,640,354	0	0	0	0	0
VMT/1000	307,077	318,107	338,507	359,449	383,624	307,077	318,107	338,507	359,449	383,624	0	0	0	0	0
Trips	58,398,717	60,771,087	64,989,893	69,166,575	73,733,600	58,398,716	60,771,087	64,989,893	69,166,574	73,733,600	-1	0	0	-1	0
Reactive Organic Gas Emissions															
Run Exh	110.3	78.9	47.7	31.4	21.3	109.1	78.1	47.4	31.2	21.2	-1.2	-0.8	-0.3	-0.2	-0.1
Idle Exh	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Start Ex	68.9	55.3	37.8	24.9	16.6	68.4	55.0	37.8	24.9	16.7	-0.5	-0.3	0.0	0.0	0.1
Total Ex	179.4	134.4	85.7	56.4	38.1	177.7	133.3	85.3	56.3	38.0	-1.7	-1.1	-0.4	-0.2	0.0
Diurnal	19.7	17.7	14.7	12.3	10.6	19.7	17.7	14.7	12.3	10.6	0.0	0.0	0.0	0.0	0.0
Hot Soak	16.7	14.0	11.5	9.9	8.6	16.7	14.0	11.5	9.9	8.6	0.0	0.0	0.0	0.0	0.0
Running	88.6	72.9	56.2	45.8	39.4	88.6	72.9	56.2	45.8	39.4	0.0	0.0	0.0	0.0	0.0
Resting	10.7	9.6	8.7	8.3	7.8	10.7	9.6	8.7	8.3	7.8	0.0	0.0	0.0	0.0	0.0
Total	315.2	248.6	176.8	132.7	104.4	313.5	247.5	176.4	132.6	104.4	-1.7	-1.1	-0.4	-0.1	0.0
Carbon Monoxide Emissions															
Run Exh	2,555.9	1,976.8	1,355.1	956.5	686.4	2548.4	1977.2	1362.0	964.6	693.3	-7.5	0.4	6.9	8.1	6.9
Idle Exh	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0
Start Ex	690.3	555.7	399.8	279.8	197.0	687.4	554.3	399.9	280.4	197.8	-2.9	-1.4	0.1	0.7	0.7
Total Ex	3,247.1	2,533.6	1,755.9	1,237.3	884.4	3236.7	2532.6	1762.9	1246.1	892.0	-10.4	-1.0	7.0	8.8	7.6
Oxides of Nitrogen Emissions															
Run Exh	265.2	193.5	126.4	84.5	59.8	264.7	193.3	126.5	84.7	59.9	-0.5	-0.2	0.1	0.2	0.2
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	51.4	45.4	37.5	28.3	20.9	51.4	45.5	37.7	28.6	21.3	0.0	0.1	0.3	0.4	0.3
Total Ex	316.6	239.0	163.9	112.8	80.7	316.1	238.9	164.3	113.3	81.3	-0.5	-0.1	0.3	0.5	0.6
Carbon Dioxide Emissions (000)															
Run Exh	148.6	152.7	160.8	173.7	184.4	148.6	152.7	160.8	173.7	184.4	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	5.4	5.5	5.7	6.0	6.3	5.4	5.5	5.7	6.0	6.3	0.0	0.0	0.0	0.0	0.0
Total Ex	154.1	158.3	166.6	179.7	190.7	154.1	158.3	166.6	179.7	190.7	0.0	0.0	0.0	0.0	0.0
PM10 Emissions															
Run Exh	4.3	4.7	5.4	6.2	6.7	4.3	4.7	5.4	6.2	6.7	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start Ex	0.5	0.5	0.6	0.6	0.7	0.5	0.5	0.6	0.6	0.7	0.0	0.0	0.0	0.0	0.0
Total Ex	4.8	5.2	5.9	6.9	7.4	4.8	5.2	5.9	6.9	7.4	0.0	0.0	0.0	0.0	0.0
TireWear	2.7	2.8	3.0	3.2	3.4	2.7	2.8	3.0	3.2	3.4	0.0	0.0	0.0	0.0	0.0
BrakeWr	4.2	4.4	4.7	5.0	5.3	4.3	4.4	4.7	5.0	5.3	0.0	0.0	0.0	0.0	0.0
Total	11.7	12.4	13.6	15.0	16.1	11.7	12.5	13.6	15.0	16.1	0.0	0.0	0.0	0.0	0.0
Lead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	2.1	1.5	1.6	1.7	1.9	2.1	1.5	1.6	1.8	1.9	0.0	0.0	0.0	0.0	0.0
Fuel Consumption (000 gallons)															
Gasoline	16,357.1	16,654.6	17,370.5	18,615.8	19,682.3	16354.8	16654.1	17371.5	18617.1	19683.6	-2.2	-0.5	1.0	1.3	1.2
Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 28B
South Coast AB Diesel Inventory Effects

	Baseline Diesel					Modified Diesel					Difference, modified minus baseline Diesel				
	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020	2002	2005	2010	2015	2020
Vehicles	250,476	259,797	262,848	267,737	274,335	250,476	259,797	262,848	267,737	274,335	0	0	0	0	0
VMT/1000	17,213	18,077	19,523	21,008	21,999	17,213	18,077	19,523	21,008	21,999	0	0	0	0	0
Trips	2,967,449	3,150,864	3,342,043	3,530,702	3,735,772	2,967,449	3,150,863	3,342,043	3,530,702	3,735,772	0	-1	0	0	0
Reactive Organic Gas Emissions															
Run Exh	9.4	8.8	7.2	5.7	4.7	7.0	6.5	5.3	4.2	3.5	-2.4	-2.3	-1.9	-1.5	-1.2
Idle Exh	0.6	0.6	0.7	0.8	0.8	0.4	0.5	0.5	0.6	0.6	-0.2	-0.2	-0.2	-0.2	-0.2
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	10.0	9.4	7.9	6.5	5.5	7.4	7.0	5.9	4.8	4.1	-2.6	-2.4	-2.1	-1.7	-1.4
Diurnal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hot Soak	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Running	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Resting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	10.0	9.4	7.9	6.5	5.5	7.4	7.0	5.9	4.8	4.1	-2.6	-2.4	-2.1	-1.7	-1.4
Carbon Monoxide Emissions															
Run Exh	43.1	40.3	34.0	29.0	26.2	43.1	40.3	34.0	29.0	26.2	0.0	0.0	0.0	0.0	0.0
Idle Exh	3.4	3.7	4.2	4.6	5.0	3.4	3.7	4.2	4.6	5.0	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	46.5	44.1	38.2	33.6	31.2	46.5	44.1	38.2	33.6	31.2	0.0	0.0	0.0	0.0	0.0
Oxides of Nitrogen Emissions															
Run Exh	276.2	250.8	188.3	114.9	72.5	290.7	264.8	199.2	121.3	76.3	14.5	14.0	10.9	6.4	3.8
Idle Exh	10.6	11.4	12.8	14.1	15.4	9.9	10.7	12.0	13.2	14.4	-0.7	-0.7	-0.8	-0.9	-1.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	286.8	262.2	201.1	129.0	87.9	300.6	275.4	211.1	134.5	90.7	13.8	13.2	10.0	5.5	2.8
Carbon Dioxide Emissions (000)															
Run Exh	31.2	33.3	38.0	42.4	45.2	31.2	33.3	38.0	42.4	45.2	0.0	0.0	0.0	0.0	0.0
Idle Exh	0.5	0.6	0.6	0.7	0.8	0.5	0.6	0.6	0.7	0.8	0.0	0.0	0.0	0.0	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	31.7	33.8	38.6	43.2	46.0	31.7	33.8	38.6	43.2	46.0	0.0	0.0	0.0	0.0	0.0
PM10 Emissions															
Run Exh	5.3	4.8	3.6	2.8	2.2	4.9	4.4	3.2	2.4	1.9	-0.3	-0.4	-0.4	-0.4	-0.3
Idle Exh	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	-0.1	-0.1	-0.1	-0.1	0.0
Start Ex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Ex	5.6	5.1	3.8	3.0	2.4	5.2	4.6	3.4	2.6	2.1	-0.4	-0.5	-0.4	-0.4	-0.3
TireWear	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.6	0.6	0.0	0.0	0.0	0.0	0.0
BrakeWr	0.2	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0
Total	6.2	5.8	4.6	3.9	3.4	5.9	5.3	4.2	3.5	3.0	-0.4	-0.5	-0.4	-0.4	-0.4
Lead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOx	2.6	2.8	0.4	0.4	0.4	2.6	2.8	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.0
Fuel Consumption (000 gallons)															
Gasoline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	2,853.4	3,044.8	3,478.0	3,883.8	4,140.3	2,853.4	3,044.8	3,478.0	3,883.8	4,140.3	0.0	0.0	0.0	0.0	0.0